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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,638	12/04/2003	Ja-Hum Ku	2421-000030/US	6177

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EXAMINER	
BOOTH, RICHARD A	

ART UNIT	PAPER NUMBER
2812	

MAIL DATE	DELIVERY MODE
07/03/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/726,638	KU ET AL.	
	Examiner	Art Unit	
	/Richard A. Booth/	2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 7-9, 15-18, 26, 28-29, and 31-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Cabral, Jr. et al., U.S. 2005/0176247.

Cabral, Jr. et al. shows the invention as claimed including a method of forming a nickel silicide layer on an exposed silicon surface comprising: depositing a nickel alloy layer on the exposed silicon surface, the nickel alloy including nickel and an alloying metal that constitutes no more than about 10 atomic percent of the nickel alloy (see paragraph 0037); reacting the nickel alloy layer with the exposed silicon surface to form a nickel silicide layer having an upper layer and a lower layer, wherein the alloying metal is preferentially segregated in the upper layer (note that this will inherently be the case since the alloying element composition will be substantially similar to that of the instant invention).

Concerning claims 2-3, 16-17, and 33-34 note that inherently these compositions will follow since the alloying elements are substantially similar compared to the instant invention.

Regarding claims 4 and 18, note that the nickel and silicon are present in the lower layer in an atomic ratio of about 1.

Concerning claims 7-9, note that the alloying metal can be tantalum in the claimed composition (see, for example, abstract and figs. 4-6).

With respect to claims 31-32, the layer is nickel monosilicide.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cabral, Jr. et al., U.S. 2005/0176247.

Cabral, Jr. et al. is applied as above but does not expressly disclose the particular processing parameters of the silicidation. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to determine through routine experimentation the optimum silicidation temperature and time based upon a variety of factors including the desired thermal budget and such limitation would not lend patentability to the instant application absent a showing of unexpected results.

Claims 5-6, 10-14, 19-20, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cabral, Jr. et al., U.S. 2005/0176247 as applied to claims 1-4, 7-9, 15-18, 26, 28-29, and 31-34 above, and further in view of Amos et al., U.S. Patent 6,846,734.

Cabral, Jr. et al. is applied as above but does not expressly disclose a capping layer of titanium nitride formed over the nickel alloy prior to reaction and then removed after the reaction.

Amos et al. discloses forming a capping layer of titanium nitride 60 on the nickel alloy before reacting the nickel alloy with the exposed silicon, where the nitrogen:titanium atomic ratio is at least 0.5 (see fig. 13 and col. 9-line 10 to col. 10-line 34). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Cabral, Jr. et al. so as to form a titanium nitride capping layer as disclosed by Amos et al. because the capping layer prevents unwanted impurities from entering the nickel alloy layer during reaction.

Claims 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cabral, Jr. et al., U.S. 2005/0176247 as applied to claims 1-4, 7-9, 15-18, 26, 28-29, and 31-34 above, and further in view of Chittipeddi et al., U.S. Patent 6,498,080.

Cabral, Jr. et al. is applied as above but does not expressly disclose forming a gate capping layer on the gate electrode to protect an upper surface of a polysilicon layer included in the gate electrode and exposing silicon surfaces only on the gate electrode while covering the source/drain regions with an insulating layer.

Chittipeddi et al. discloses exposing silicon surfaces on the gate electrode 15 while covering the source/drain regions with an insulating layer 57 (see fig. 12) or forming a gate capping layer 17 on the gate electrode to protect an upper surface of a polysilicon layer included in the gate electrode (see figs. 8-9), exposing portions of the semiconductor substrate in a source/drain region formed in the active region and exposing a silicon surface on the gate electrode. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Cabral, Jr. et al. so as to include the silicidation processes of Chittipeddi et al. because this allows for greater flexibility in the process since the gate and source/drain regions do not need to be all silicided or all silicided from the same material.

Response to Arguments

Applicant's arguments filed 05/02/08 have been fully considered but they are not persuasive. Applicant argues that a case of inherency has not been made by the examiner with respect to the Cabral, Jr. et al. reference, US 2005/0176247. However, the examiner respectfully submits that Cabral, Jr. et al. discloses embodiments including the alloying elements in the claimed compositions and therefore it would be expected that a similar result would be achieved with the reacting process step.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine the secondary reference of Amos with the primary reference of Cabral, Jr. et al. is because the capping layer prevents unwanted impurities from entering the nickel alloy layer during reaction. Furthermore, the additional motivation used to combine the Cabral and Chittipeddi references is also believed proper and that rejection is also maintained for the reasons of record.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to /Richard A. Booth/ whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Garber can be reached on (571) 272-2194. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Richard A. Booth/
Primary Examiner
Art Unit 2812

June 30, 2008

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	10/726,638	KU ET AL.	
	Examiner	Art Unit	
	/Richard A. Booth/	2812	